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PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-100866

(43)Date of publication of application : 07.04.2000

(51)Int.Cl.

H01L 21/60

(21)Application number : 10-264993

(71)Applicant : PFU LTD

(22)Date of filing : 18.09.1998

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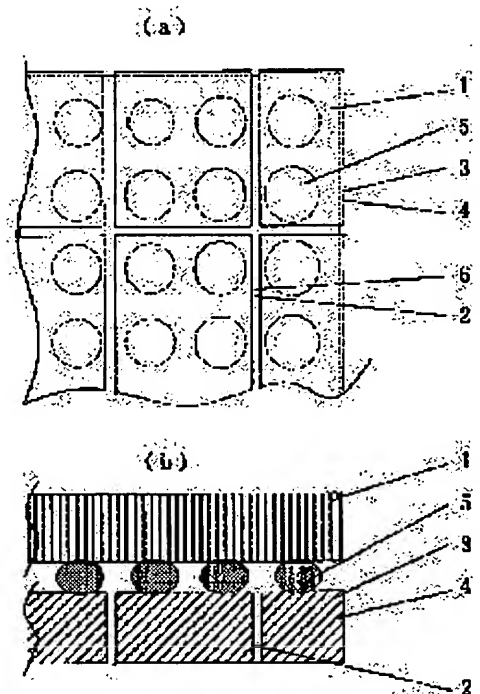
(54) SEMICONDUCTOR CONNECTION STRUCTURE AND SEMICONDUCTOR DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To realize a semiconductor device for which the sliding of a junction section is relaxed by absorption so as to be protected against disconnection, even if the semiconductor device is utilized in an environment where temperature changes cyclically, by a method wherein an absorption relaxing means that absorbs a thermal expansion difference between a carrier or a printed wiring board and a semiconductor chip is provided to the carrier or the printed wiring board.

SOLUTION: When a semiconductor chip 1 is connected to a carrier or a printed wiring board 4, an absorption relaxing means 2, such as grooves that absorb a thermal expansion difference between the semiconductor chip 1 and the carrier or the printed wiring board 4, is provided to the carrier or the printed wiring board

4. Therefore, the flow of cooling air comes into contact with the surface of the semiconductor chip 1 through the grooves, or cooling of the semiconductor chip 1 can be accelerated by enlarging the contacting surface of the chip 1 with the carrier in area by the use of heat conductive material. With this setup, even if the semiconductor device is utilized repeatedly in an environment where there is temperature difference, a joint between the semiconductor chip 1 and the carrier or the printed wiring board 4 can be restrained from being disconnected against sliding movement caused by thermal expansion difference, and the semiconductor device can be improved in connection reliability.



(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2000-100866

(P2000-100866A)

(43) 公開日 平成12年4月7日(2000.4.7)

(51) Int.Cl.⁷

H 0 1 L 21/60

識別記号

3 1 1

F I

H 0 1 L 21/60

テマコード(参考)

3 1 1 S 4 M 1 0 5

審査請求 未請求 請求項の数7 OL (全 8 頁)

(21) 出願番号

特願平10-264993

(22) 出願日

平成10年9月18日(1998.9.18)

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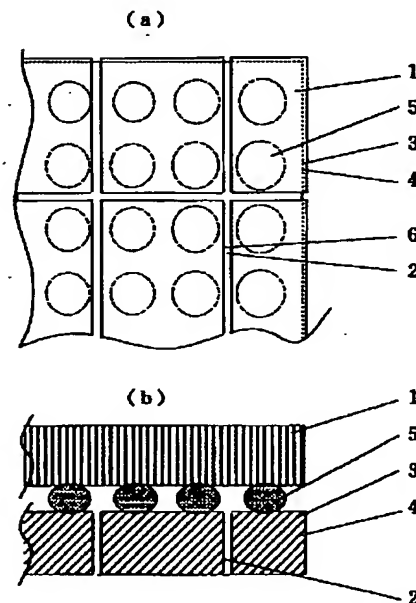
Fターム(参考) 4M105 AA01 GG10

(54) 【発明の名称】 半導体の接続構造および半導体装置

(57) 【要約】

【課題】 本発明は、半導体チップとキャリア、あるいは半導体チップとプリント配線板、そしてキャリアとプリント配線板との間にバンパを介してフェースダウンマウント手法で接続する構造に関わり、バンパの接続信頼性を改善でき、半導体チップの冷却効果を促進できる半導体の接続構造および半導体装置を提供する。

【解決手段】 本発明は、キャリアあるいはプリント配線板に、半導体チップなどとの熱膨張差を吸収する吸収緩和手段を設け、バンパの熱応力を緩和する形態とした。



1 半導体チップ
3 キャリア
5 バンパ

2 吸収緩和手段
4 プリント配線板

【特許請求の範囲】

【請求項1】半導体チップのフェースダウンマウント手法を用いた半導体の接続構造において、キャリア(3)あるいはプリント配線板(4)に、半導体チップ(1)などとの熱膨張差を吸収する吸収緩和手段(2)を設け、バンパ(5)の熱応力を緩和する、ことを特徴とする半導体の接続構造。

【請求項2】前記吸収緩和手段(2)は、キャリア(3)あるいはプリント配線板(4)と、半導体チップ(1)などとの接続処理後にキャリア(3)あるいはプリント配線板(4)を区画する溝(6)を形成する、ことを特徴とする請求項1記載の半導体の接続構造。

【請求項3】前記吸収緩和手段(2)は、キャリア(3)あるいはプリント配線板(4)に薄板部(8)を持つ溝(6)を形成する、ことを特徴とする請求項1記載の半導体の接続構造。

【請求項4】前記吸収緩和手段(2)は、キャリア(3)あるいはプリント配線板(4)を貫通する穴(9)を形成する、ことを特徴とする請求項1記載の半導体の接続構造。

【請求項5】前記吸収緩和手段(2)は、キャリア(3)あるいはプリント配線板(4)の外周に切込み(7)を形成する、ことを特徴とする請求項1または4のいずれか1項記載の半導体の接続構造。

【請求項6】前記吸収緩和手段(2)は、キャリア(3)あるいはプリント配線板(4)に薄板部(8)を持つ溝(6)を形成し、さらにキャリア(3)あるいはプリント配線板(4)の外周に切込み(7)を形成する、ことを特徴とする請求項2または5のいずれか1項記載の半導体の接続構造。

【請求項7】半導体チップのフェースダウンマウント手法を用いた半導体装置において、キャリア(3)あるいはプリント配線板(4)に半導体チップ(1)などとの熱膨張差を吸収する吸収緩和手段(2)を設け、バンパ(5)の熱応力を緩和する、ことを特徴とする半導体装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、半導体を高密度に実装するために、CSP(Chip Scale Package)あるいはCase Size Package)実装法による半導体チップとキャリア、あるいは半導体チップとプリント配線板、そしてキャリアとプリント配線板との間にバンパを介してフェースダウンマウント手法で接続する構造に関わり、バンパとCSP形のキャリアあるいはバンパとベアチップ実装法のプリント配線板、そしてバンパとCSP形のキャリアやフェースダウンマウント手法でのバンパの接続信頼性を改善でき、半導体チップの冷却を促進できる半導体の接続構造および半導体装置の実現に関する。

【0002】

【従来の技術】図8の要部の拡大図に示す従来例の半導体チップとキャリア、あるいは半導体チップとプリント配線板、そしてキャリアとプリント配線板との間にバンパを介してフェースダウンマウント手法で接続する構造は、キャリア53あるいはプリント配線板54に熱膨張差を吸収緩和する形態を持たない、通常の工程処理で得られる図8(b)の断面図に示すような単純な矩形の断面形状としたもので、当該接続構造を繰り返し温度差のある環境のもとで使用する場合、半導体チップ51の約3ppmの熱膨張率、キャリア53の約7ppmの熱膨張率、プリント配線板54では約16ppmとなる熱膨張率の差異により、バンパ55に摺動による応力が集中して、図8(b)に示すような亀裂60が発生し、断線につながる可能性がある。

【0003】

【発明が解決しようとする課題】本発明は、前記従来例半導体の接続構造での次の問題点解決を課題とする。半導体チップとキャリア、あるいは半導体チップとプリント配線板、そしてキャリアとプリント配線板との間にバンパを介してフェースダウンマウント手法で接続する構造において、

1)半導体チップでは約3ppmの熱膨張率、キャリアでは約7ppmの熱膨張率、プリント配線板では約16ppmの熱膨張率が存在し、各材料間の境界では繰り返し温度差のある環境のもとで使用する場合、熱膨張率の差異により摺動が発生する。

2)特に半導体チップとプリント配線板との間にバンパを介してフェースダウンマウント手法で接続する構造の場合では約13ppmにもおよぶ熱膨張率の差異があり、繰り返し温度差のある環境のもとで使用するすると材料間の境界で発生した摺動により、バンパに応力が集中し亀裂が発生して、断線が発生し易くなり、接続信頼性を損なうことになる。

【0004】

【課題を解決するための手段】本発明は上記問題を解決するために、キャリアあるいはプリント配線板に、半導体チップなどとの熱膨張差を吸収する吸収緩和手段を設け、バンパの熱応力を緩和する接続構造とした。この手段によって、半導体チップなどとキャリアあるいはプリント配線板との熱膨張差を吸収緩和することができるため、繰り返し温度差のある環境のもとで使用する場合でも接合部の摺動を吸収緩和し、断線の防止ができ、バンパとフットプリントとの接続信頼性を改善させることができ、半導体チップの冷却を促進できる接続構造と半導体装置とを提供する。

【0005】

【発明の実施の形態】まず、図1に示すように本発明では、例えばCSP手法を用いてキャリア3あるいはプリント配線板4に半導体チップ1などを接続する場合、キ

キャリア3あるいはプリント配線板4に、例えば溝による半導体チップ1などとの熱膨張差を吸収する吸収緩和手段2を設け、バンパ5の熱応力を緩和する形態とした。この手段によって、溝によって半導体チップなどとキャリアあるいはプリント配線板との熱膨張差を吸収緩和することができ、溝や穴そして切込みによって冷却風が半導体チップの表面に触れ、あるいは熱伝導性物質によってキャリアとの表面積を拡大して半導体チップの冷却を促進できるため、繰り返し温度差のある環境のもとで使用する場合でも半導体チップなどのバンパとキャリアあるいはプリント配線板とが摺動に対応して接合を維持し、接続信頼性を改善させることができる作用を得る。

【0006】次に、図2に示すように本発明では、例えばキャリア3に引出し導体のない、半導体チップ1の端子ピッチとキャリア3の端子ピッチとが同一の形態の場合において、前記熱膨張差を吸収する吸収緩和手段2を、キャリア3と、半導体チップ1との接続処理後にキャリア3を区画する溝6を形成した。この手段によって、半導体チップとの接続処理後にキャリアを区画する溝部分を切断し、キャリアを細分化したため、熱膨張によって摺動する範囲を狭め摺動量を少なくできると共に断線を防止でき、また熱伝導性物質によって半導体チップの冷却を促進でき、半導体チップのバンパとキャリアとの接続信頼性をより改善させることができる作用を得る。

【0007】また、図3に示すように本発明では、前記熱膨張差を吸収する吸収緩和手段2を、キャリア3あるいはプリント配線板4に薄板部8を持つ溝6を形成した。この手段によって、キャリアあるいはプリント配線板に薄板部を持つため、薄板部に引出し導体を設けても良い、熱膨張差を吸収する吸収緩和手段部となり、熱膨張によって摺動した範囲を吸収し摺動量を少なくできると共に断線を防止でき、特にキャリアに引出し導体のある、半導体チップなどの端子ピッチとキャリアの端子ピッチとが異なる形態の場合でも適用でき、接続信頼性を高く維持させることができる作用を得る。

【0008】さらに、図4に示すように本発明では、前記熱膨張差を吸収する吸収緩和手段2を、キャリア3あるいはプリント配線板4を貫通する穴9を形成した。この手段によって、キャリアあるいはプリント配線板に穴を設けたため、当該穴がキャリアあるいはプリント配線板を細分化することに近い状態となり、熱膨張差を吸収する吸収緩和手段となって半導体チップなどのバンパとキャリアあるいはプリント配線板との接続信頼性をより高く維持させることができると共に穴によって冷却風が半導体チップの表面に触れ、あるいは熱伝導性物質によってキャリアの表面積を拡大して冷却を促進できる作用を得る。

【0009】次に、図5に示すように本発明では、前記熱膨張差を吸収する吸収緩和手段2を、キャリア3ある

いはプリント配線板4の外周に切込み7を形成した。この手段によって、キャリアあるいはプリント配線板の外周に切込みを設けたため、切込みによってキャリアあるいはプリント配線板の熱膨張量の大きい外周を細分化することに近い状態となることで、熱膨張差を吸収する吸収緩和手段となって半導体チップなどのバンパとキャリアあるいはプリント配線板との接続信頼性をより高く維持させることができると共に切込みや熱伝導性物質によって冷却を促進できる作用を得る。

10 【0010】また、図6に示すように本発明では、前記熱膨張差を吸収する吸収緩和手段2を、キャリア3あるいはプリント配線板4に薄板部8を持つ溝6を形成し、さらにキャリア3あるいはプリント配線板4の外周に切込み7を持つ形態とした。この手段によって、キャリアあるいはプリント配線板に薄板部を持つ溝を形成し、さらにキャリアあるいはプリント配線板外周に切込みを持つキャリアあるいはプリント配線板にしたため、2重の吸収緩和手段で半導体チップの端子ピッチとキャリアの端子ピッチとが大きく異なる形態の場合でも適用でき、

20 バンパとキャリアあるいはプリント配線板との接続信頼性を極高く維持させることができる作用を得る。なお当該構造は、マルチチップ形式でチップ間を接続する導体がある形態に最も適する。

【0011】さらに、図7に示すように本発明では、キャリア3あるいはプリント配線板4に溝などの半導体チップ1などとの熱膨張差を吸収する吸収緩和手段2を設け、バンパ5の熱応力を緩和する接続構造を用いた、半導体装置とした。この手段によって、溝などによって半導体チップなどとキャリアあるいはプリント配線板との熱膨張差を吸収緩和することができるため、繰り返し温度差のある環境のもとで使用する場合でも半導体チップなどのバンパとキャリアあるいはプリント配線板のフットプリントとが摺動に対応して接合を維持し、接続信頼性を改善させることができる半導体チップなどとキャリアあるいはプリント配線板のフットプリントとの接続信頼性と熱伝導性物質によって半導体チップの冷却性を改善した半導体装置にすることができる作用を得る。

【0012】

40 【実施例】以下、図1ないし図7の本発明に関わる実施例の図面を参照して説明する。

【0013】図1ないし図7の本発明に関わる、主に半導体チップとキャリアとの接続構造実施例の図面に用いた符号について一括して以下に説明する。1はフェースダウンマウント手法を用いキャリア3あるいはプリント配線板4に接続される半導体チップである。2はキャリア3あるいはプリント配線板4と半導体チップ1との熱膨張率の差異を吸収緩和する吸収緩和手段である。3は半導体チップ1を実装するキャリアである。4は半導体チップ1などと接続するプリント配線板である。5はフェースダウンマウント手法を用いキャリア3あるいはプ

プリント配線板4と半導体チップ1との接続介在となるバンパである。6はキャリア3あるいはプリント配線板4に設ける熱膨張差を吸収する吸収緩和手段2となる溝である。7はキャリア3あるいはプリント配線板4に設ける熱膨張差を吸収する吸収緩和手段2となる切込みである。8はキャリア3あるいはプリント配線板4に設ける熱膨張差を吸収する吸収緩和手段2となる溝6により形成される薄板部である。9はキャリア3あるいはプリント配線板4に設ける熱膨張差を吸収する吸収緩和手段2となる穴である。10は半導体チップ1を実装した半導体装置である。

【0014】図1は、本発明の原理図であり、(a)は底面図で(b)は断面図で何れも要部の拡大図で示す。同図において本発明の半導体の接続構造は、例えばCSP手法を用いてキャリア3あるいはプリント配線板4に半導体チップ1などを接続する場合、キャリア3あるいはプリント配線板4に、例えば溝による半導体チップ1などとの熱膨張差を吸収する吸収緩和手段2を設け、バンパ5の熱応力を緩和する形態とした。このことによって、溝に熱膨張分を吸収させることによって半導体チップなどとキャリアあるいはプリント配線板との熱膨張差を吸収緩和することができ、また放熱板などの熱伝導性物質によって半導体チップの冷却を促進できるため、繰り返し温度差のある環境のもとで使用する場合でも半導体チップなどのバンパとキャリアあるいはプリント配線板とが摺動に対応して接合を維持し、接続信頼性を改善させることができる。

【0015】図2は、本発明の実施例図であり、(a)は底面図、(b)は分断前の断面図そして(c)は分断後の断面図で何れも要部の拡大図で示す。同図において本発明の半導体の接続構造は、例えばキャリア3に引出し導体のない、半導体チップ1の端子ピッチとキャリア3の外部接続端子ピッチとが同一の形態の場合において、前記熱膨張差を吸収する吸収緩和手段2を、キャリア3と、半導体チップ1との接続処理後に容易にレーザ加工機などで一括あるいは走査加工によってキャリア3を分断することができる前記加工と同様な加工を予めキャリア3に施し、半導体チップ1側まで貫通しないもの厚さを残した溝6を形成した。このことによって、半導体チップとの接続処理後にキャリアを分断する溝部分を切断し、キャリアを細分化したため、熱膨張によって摺動する範囲を狭め摺動量を少なくできると共に溝に熱膨張分を吸収させることで断線を防止できる。また半導体チップへの冷却風が半導体チップの表面に触れることや熱伝導性物質によって半導体チップの冷却を促進でき、半導体チップのバンパとキャリアとの接続信頼性をより改善させることができる。

【0016】図3は、本発明の他の実施例図であり、(a)は底面図で(b)は断面図で何れも要部の拡大図で示す。同図において本発明の半導体の接続構造は、前

記熱膨張差を吸収する吸収緩和手段2を、予め半導体チップ1側まで貫通しないように加工した溝6でキャリア3あるいはプリント配線板4に図示しない導体を設定できる薄板部8を持つ形態とした。このことによって、キャリアあるいはプリント配線板に薄板部を持つため、薄板部に引出し導体を設けても良い、熱膨張差を吸収する吸収緩和手段部となり、溝が熱膨張によって摺動した範囲を吸収し摺動量を少なくできると共に断線を防止でき、特にキャリアに引出し導体のある、半導体チップなどの端子ピッチとキャリアの外部接続端子ピッチとが異なる形態の場合でも適用でき、接続信頼性を高く維持させることができる。

【0017】図4は、本発明の他の実施例図であり、(a)は底面図で(b)は断面図で何れも要部の拡大図で示す。同図において本発明の半導体の接続構造は、前記熱膨張差を吸収する吸収緩和手段2を、バンパ5間の中間に設定したプリント配線板4を貫通する極小径でなる穴9を形成した。このことによって、キャリアあるいはプリント配線板に穴を設けたため、当該穴がキャリアあるいはプリント配線板を細分化することに近い状態となり、熱膨張分が穴に吸収され熱膨張差を吸収する吸収緩和手段となって半導体チップなどのバンパとキャリアあるいはプリント配線板との接続信頼性をより高く維持させることができると共に穴によって半導体チップの表面に冷却風が流れまた熱伝導性物質によって冷却を促進できるようにすることができる。

【0018】図5は、本発明の他の実施例図であり、(a)は底面図で(b)は断面図で何れも要部の拡大図で示す。同図において本発明の半導体の接続構造は、前記熱膨張差を吸収する吸収緩和手段2を、キャリア3あるいはプリント配線板4の外周に細長い切込み7を形成した。このことによって、キャリアあるいはプリント配線板の外周に切込みを設けたため、切込みによってキャリアあるいはプリント配線板の熱膨張量の大きい外周を細分化することに近い状態となることで、熱膨張差を吸収する吸収緩和手段となって半導体チップなどのバンパとキャリアあるいはプリント配線板との接続信頼性をより高く維持させることができると共に切込みによって半導体チップの表面に冷却風が流れまた熱伝導性物質によって冷却を促進できる。

【0019】図6は、本発明の他の実施例図であり、(a)は底面図で(b)は断面図で何れも要部の拡大図で示す。同図において本発明の半導体の接続構造は、前記熱膨張差を吸収する吸収緩和手段2を、中心部にキャリア3あるいはプリント配線板4に図示しない導体を設定できる薄板部8を持つ溝6を形成し、さらにキャリア3あるいはプリント配線板4の外周に細長い切込み7を持つ形態とした。このことによって、中心部にキャリアあるいはプリント配線板に薄板部を持つ溝を形成し、さらにキャリアあるいはプリント配線板の外周に細長い切

込みを持つキャリアあるいはプリント配線板にしたため、2重の吸収緩和手段で半導体チップの端子ピッチとキャリアの外部接続端子ピッチとが大きく異なる形態の場合でも適用でき、バンパとキャリアあるいはプリント配線板との接続信頼性を極高く維持させることができる。なお当該構造は、マルチチップ形式でチップ間を接続する図示しない導体がある形態に最も適する。

【0020】図7は、本発明の他の実施例図であり、

(a)は底面図で(b)は断面図で何れも要部の拡大図で示す。同図において本発明の半導体の半導体装置は、キャリア3あるいはプリント配線板4に溝などの半導体チップ1などとの熱膨張差を吸収する吸収緩和手段2を設け、バンパ5の熱応力を緩和する接続構造を用いた、半導体装置10とした。このことによって、溝などによって熱膨張分が吸収されることによって半導体チップなどとキャリアあるいはプリント配線板との熱膨張差を吸収緩和することができるため、繰り返し温度差のある環境のもとで使用する場合でも半導体チップなどのバンパとキャリアあるいはプリント配線板とが摺動に対応して接合を維持し、接続信頼性を改善させることができる半導体チップなどとキャリアあるいはプリント配線板との接続信頼性と半導体チップの冷却性を改善した半導体装置にすることができる。

【0021】

【発明の効果】以上説明した本発明は、次の効果が期待できる。

【0022】まず、キャリアあるいはプリント配線板に、半導体チップなどとの熱膨張差を吸収する吸収緩和手段を設け、バンパの熱応力を緩和する形態とした。このことで、溝などに熱膨張分が吸収されることによって半導体チップなどとキャリアあるいはプリント配線板との熱膨張差を吸収緩和することができ、また溝などによって冷却風が半導体チップの表面を流れまた熱伝導性物質によって半導体チップの冷却を促進できるため、繰り返し温度差のある環境のもとで使用する場合でも半導体チップなどのバンパとキャリアあるいはプリント配線板が摺動に対応して接合を維持し、接続信頼性を改善させることができる。

【0023】次に、前記熱膨張差を吸収する吸収緩和手段を、キャリアあるいはプリント配線板と、半導体チップなどとの接続処理後にキャリアあるいはプリント配線板を分断する溝を形成した。このことで、半導体チップなどとの接続処理後にキャリアを分断する溝部分を切断し、キャリアあるいはプリント配線板を細分化したため、前記の効果に加え、溝が熱膨張によって摺動する範囲を狭め摺動量を少なくできると共に断線を防止でき、また冷却風が半導体チップの表面を流れさらに熱伝導性物質によって半導体チップの冷却を促進でき、半導体チップなどのバンパとキャリアあるいはプリント配線板との接続信頼性をより改善させることができる。

【0024】また、前記熱膨張差を吸収する吸収緩和手段を、キャリアあるいはプリント配線板に薄板部を持つ溝を形成した。このことで、キャリアあるいはプリント配線板に薄板部を持つため、前記の効果に加え、薄板部に引出し導体を設けても良い、熱膨張差を吸収する吸収緩和手段部となり、溝が熱膨張によって摺動した範囲を吸収し摺動量を少なくできると共に断線を防止でき、特にキャリアに引出し導体のある、半導体チップなどの端子ピッチとキャリアの外部接続端子ピッチとが異なる形態の場合でも適用でき、導体設定可能域を広く確保することができる。

【0025】さらに、前記熱膨張差を吸収する吸収緩和手段を、キャリアあるいはプリント配線板を貫通する穴を形成した。このことで、キャリアあるいはプリント配線板に穴を設けたため、前記の効果に加え、当該穴がキャリアあるいはプリント配線板を細分化することに近い状態となり、熱膨張分が穴に吸収されることで熱膨張差を吸収する吸収緩和手段となって半導体チップなどのバンパとキャリアあるいはプリント配線板との接続信頼性をより高く維持させることができると共に穴によって冷却風が半導体チップの表面を流れまた熱伝導性物質によって冷却を促進できるようにすることができる。

【0026】次に、前記熱膨張差を吸収する吸収緩和手段を、キャリアあるいはプリント配線板の外周に切込みを形成した。このことで、キャリアあるいはプリント配線板の外周に切込みを設けたため、前記の効果に加え、切込みによってキャリアあるいはプリント配線板の熱膨張量の大きい外周を細分化することに近い状態となることで、熱膨張差を吸収する吸収緩和手段となって半導体チップなどのバンパとキャリアあるいはプリント配線板との接続信頼性をより高く維持させることができると共に切込みによって冷却風が半導体チップの表面を流れまた熱伝導性物質によって冷却を促進できる。

【0027】また、前記熱膨張差を吸収する吸収緩和手段を、キャリアあるいはプリント配線板に薄板部を持つ溝を形成し、さらにキャリアあるいはプリント配線板の外周に切込みを形成した。このことで、中心部にキャリアあるいはプリント配線板に薄板部を持つ溝を形成し、さらにキャリアあるいはプリント配線板の外周に切込みを持つキャリアあるいはプリント配線板にしたため、前記の効果に加え、導体設定可能域の制限を少なくして2重の吸収緩和手段で半導体チップの端子ピッチとキャリアの外部接続端子ピッチとが大きく異なる形態の場合でも適用でき、バンパとキャリアあるいはプリント配線板との接続信頼性を極高く維持させることができる。なお当該構造は、マルチチップ形式でチップ間を接続する導体がある形態に最も適する。

【0028】さらに、キャリアあるいはプリント配線板に半導体チップなどとの熱膨張差を吸収する吸収緩和手段を設け、バンパの熱応力を緩和する接続構造を用い

た、半導体装置とした。このことで、溝などに熱膨張分を吸収させることで半導体チップなどとキャリアあるいはプリント配線板との熱膨張差を吸収緩和することができるため、前記の効果に加え、繰り返し温度差のある環境のもとで使用する場合でも半導体チップなどのパンパとキャリアあるいはプリント配線板とが摺動に対応して接合を維持し、接続信頼性を改善した半導体装置にすることができる。

【図面の簡単な説明】

【図1】本発明の原理図である。

【図2】本発明の実施例図である。

【図3】本発明の他の実施例図である。

【図4】本発明の他の実施例図である。

【図5】本発明の他の実施例図である。

【図6】本発明の他の実施例図である。

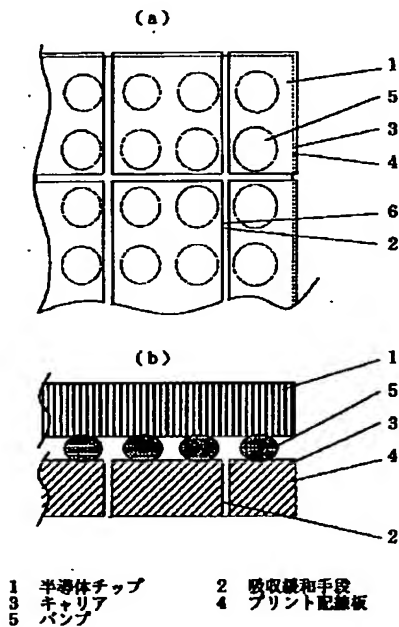
【図7】本発明の他の実施例図である。

【図8】従来例の実施例図である。

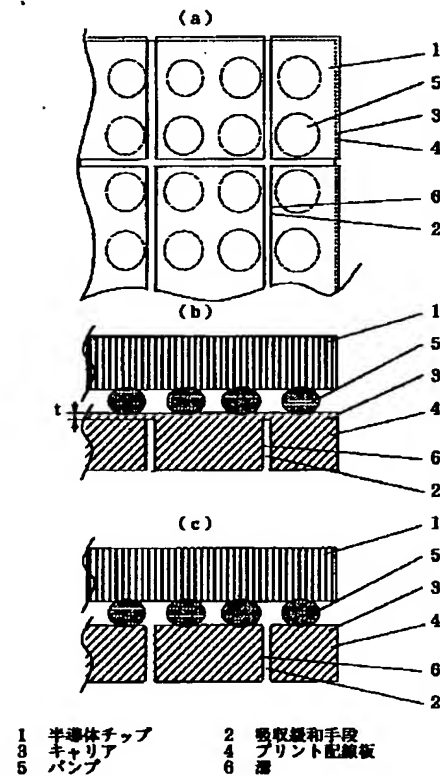
【符号の説明】

- 1 半導体チップ
- 2 吸収緩和手段
- 3 キャリア
- 4 プリント配線板
- 6 溝
- 7 切込み
- 8 薄板部
- 9 穴

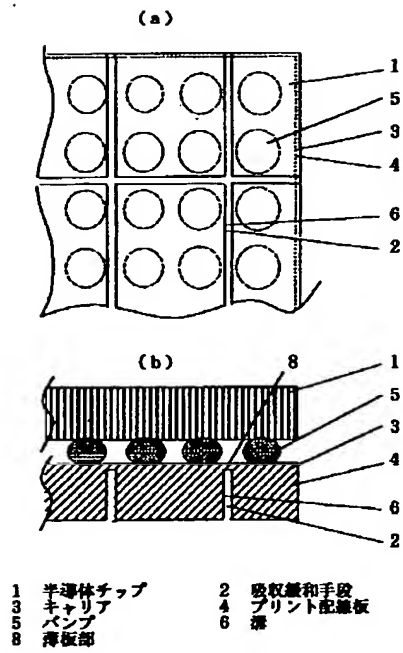
【図1】



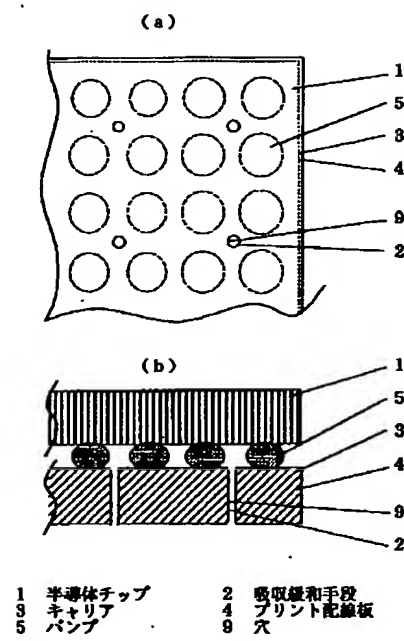
【図2】



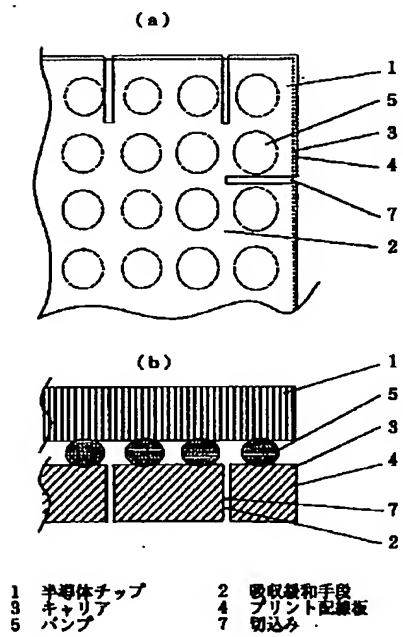
【図3】



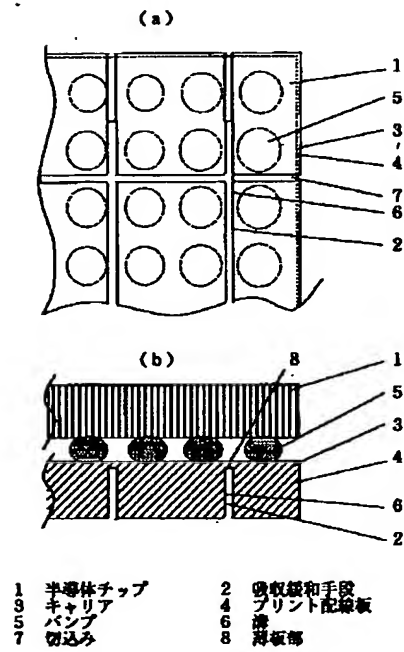
【図4】



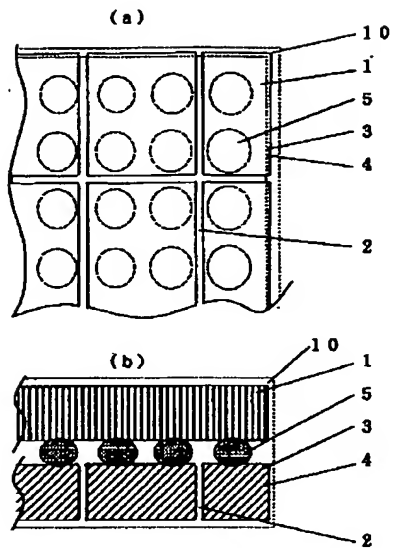
【図5】



【図6】

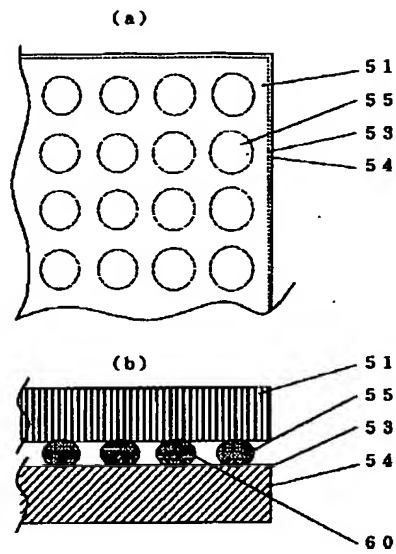


【図7】



- | | | | |
|---|--------|----|---------|
| 1 | 半導体チップ | 2 | 吸収層と手段 |
| 3 | キャリア | 4 | プリント配線板 |
| 5 | ポンプ | 10 | 半導体装置 |

【図8】



- | | | | |
|----|--------|----|---------|
| 51 | 半導体チップ | 54 | プリント配線板 |
| 53 | キャリア | 60 | 電装 |
| 55 | ポンプ | | |

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention] The semiconductor chip and carrier by the CSP (Chip Scale Package or Case Size Package) mounting method since this invention mounts a semi-conductor in high density, Or it is concerned with the structure connected by the face down mounting technique through a bump between a semiconductor chip, a printed wired board, and a carrier and a printed wired board. The carrier of a bump and a CSP form, or the printed wired board of a bump and the bare chip mounting method, And the connection dependability of a bump, and the carrier of a CSP form and the bump in the face down mounting technique can be improved, and it is related with the connection structure of the semi-conductor which can promote cooling of a semiconductor chip, and implementation of a semiconductor device.

[0002]

[Description of the Prior Art] The semiconductor chip, the carrier or semiconductor chip, and printed wired board of the conventional example shown in the enlarged drawing of the important section of drawing 8 , And the structure connected by the face down mounting technique through a bump between a carrier and a printed wired board It is what was made into the cross-section configuration of a simple rectangle as shown in the sectional view of drawing 8 (b) obtained by the usual process processing which does not have the gestalt which carries out absorption relaxation of the differential thermal expansion in a carrier 53 or a printed wired board 54. When using it under the environment which repeats the connection structure concerned and has a temperature gradient, according to the difference between the coefficient of thermal expansion of about 3 ppm of a semiconductor chip 51, the coefficient of thermal expansion of about 7 ppm of a carrier 53, and the coefficient of thermal expansion set to about 16 ppm in a printed wired board 54 The stress by sliding may concentrate on a bump 55, the crack 60 as shown in drawing 8 (b) may occur, and it may lead to an open circuit.

[0003]

[Problem(s) to be Solved by the Invention] This invention makes a technical problem trouble solution next to the connection structure of said conventional example semi-conductor. In the structure connected by the face down mounting technique through a bump between a semiconductor chip, a carrier or a semiconductor chip, a printed wired board, and a carrier and a printed wired board, when using it at 1 semiconductor chip under the environment which the coefficient of thermal expansion of about 16 ppm exists on the coefficient of thermal expansion of about 3 ppm, and a carrier in the coefficient of thermal expansion of about 7 ppm, and a printed wired board, and has a temperature gradient on the boundary between each ingredient repeatedly, sliding occurs according to the difference in coefficient of thermal expansion.

2) sliding generated on the boundary between ingredients when it was used under the environment which has the difference in the coefficient of thermal expansion which also amounts to about 13 ppm in the case of structure especially connected by the face down mounting technique through a bump between a semiconductor chip and a printed wired board , and has a repeat temperature gradient -- a bump -- stress -- concentrate -- a crack -- generate -- an open circuit -- generate -- be easy -- connection dependability will be spoiled .

[0004]

[Means for Solving the Problem] In order to solve the above-mentioned problem, this invention established an absorption relaxation means to absorb a differential thermal expansion with a semiconductor chip etc. to a carrier or a printed wired board, and made it the connection structure which eases a bump's thermal stress. With this means, since absorption relaxation of the differential thermal expansion with a semiconductor chip, etc. a carrier, or a printed wired board can be carried out, even when using it under an environment with a repeat temperature gradient, absorption relaxation of the sliding of a joint can be carried out, prevention of an open circuit can be performed, the connection dependability of a bump and a footprint can be made to improve, and the connection structure and the semiconductor device which can

promote cooling of a semiconductor chip are offered.

[0005]

[Embodiment of the Invention] First, as shown in drawing 1 , when a semiconductor chip 1 etc. was connected to a carrier 3 or a printed wired board 4 in this invention, for example using the CSP technique, an absorption relaxation means 2 to absorb a differential thermal expansion with the semiconductor chip 1 by the slot etc. was formed in the carrier 3 or the printed wired board 4, and it considered as the gestalt which eases a bump's 5 thermal stress. With this means, absorption relaxation of the differential thermal expansion with a semiconductor chip, etc. a carrier, or a printed wired board can be carried out by the slot. Since a cooling wind touches on the surface of a semiconductor chip with a slot, a hole, and infeed, or surface area with a carrier is expanded with the thermally conductive matter and cooling of a semiconductor chip can be promoted, Even when using it under an environment with a repeat temperature gradient, a bump, a carrier, or printed wired boards, such as a semiconductor chip, maintain junction corresponding to sliding, and acquire the operation which can make connection dependability improve.

[0006] Next, as shown in drawing 2 , when the terminal pitch of a semiconductor chip 1 which pulls out, for example on a carrier 3 in this invention, and does not have a conductor, and the terminal pitch of a carrier 3 were the same gestalten, the slot 6 which divides a carrier 3 for an absorption relaxation means 2 to absorb said differential thermal expansion, after connection processing with a carrier 3 and a semiconductor chip 1 was formed. Since a part for the slot which divides a carrier was cut and the carrier was subdivided after connection processing with a semiconductor chip with this means, while narrowing the range on which it slides by thermal expansion and being able to lessen the amount of sliding, an open circuit can be prevented, and cooling of a semiconductor chip can be promoted with the thermally conductive matter, and the operation which can make the connection dependability of the bump of a semiconductor chip and a carrier improve more is acquired.

[0007] Moreover, as shown in drawing 3 , in this invention, the slot 6 which has the sheet metal section 8 for an absorption relaxation means 2 to absorb said differential thermal expansion in a carrier 3 or a printed wired board 4 was formed. Since it has the sheet metal section in a carrier or a printed wired board with this means, It becomes the absorption relaxation means section which may pull out in the sheet metal section and may prepare a conductor and which absorbs a differential thermal expansion. An open circuit can be prevented, while absorbing the range on which it slid by thermal expansion and being able to lessen the amount of sliding. It can apply, even when it is the gestalt which pulls out especially on a carrier and has a conductor and from which terminal pitches, such as a semiconductor chip, and the terminal pitch of a carrier differ, and the operation which can maintain connection dependability highly is acquired.

[0008] Furthermore, as shown in drawing 4 , in this invention, the hole 9 which penetrates a carrier 3 or a printed wired board 4 for an absorption relaxation means 2 to absorb said differential thermal expansion was formed. The operation which it will be in the condition near the hole concerned subdividing a carrier or a printed wired board since the hole was established in the carrier or the printed wired board with this means, a cooling wind touches on the surface of a semiconductor chip by the hole while being able to become an absorption relaxation means absorb a differential thermal expansion and being able to maintain more highly bumps, such as a semiconductor chip, a carrier, or connection dependability with a printed wired board, or expands the surface area of a carrier with the thermally conductive matter, and can promote cooling acquires.

[0009] Next, as shown in drawing 5 , in this invention, infeed 7 was formed in the periphery of a carrier 3 or a printed wired board 4 for an absorption relaxation means 2 to absorb said differential thermal expansion. Since infeed was prepared in the periphery of a carrier or a printed wired board with this means, while being able to become an absorption relaxation means to absorb a differential thermal expansion and being able to maintain more highly bumps, such as a semiconductor chip, a carrier, or connection dependability with a printed wired board with infeed because it will be in the condition near subdividing a periphery with large carrier or amount of thermal expansion of a printed wired board, the operation which can promote cooling with infeed or the thermally conductive matter is acquired.

[0010] Moreover, as shown in drawing 6 , the slot 6 which has the sheet metal section 8 for an absorption relaxation means 2 to absorb said differential thermal expansion in a carrier 3 or a printed wired board 4 in this invention was formed, and it considered as the gestalt which has infeed 7 in the periphery of a carrier 3 or a printed wired board 4 further. with this means , the slot which have the sheet metal section in a carrier or a printed wired board be form , it write to the carrier or printed wired board which have infeed in a carrier or a printed wired board periphery further , even when it be the gestalt from which the terminal pitch of a semiconductor chip and the terminal pitch of a carrier differ greatly with the absorption relaxation means of a duplex , it can apply , and the operation which can maintain very highly a bump , a carrier , or connection dependability with a printed wired board be acquire . In addition, the structure concerned is most suitable for a gestalt with the conductor which connects between chips in a multichip format.

[0011] Furthermore, as shown in drawing 7 , in this invention, an absorption relaxation means 2 to absorb a differential

thermal expansion with the semiconductor chips 1, such as a slot, etc. to a carrier 3 or a printed wired board 4 was established, and it considered as the semiconductor device using the connection structure which eases a bump's 5 thermal stress. Since absorption relaxation of the differential thermal expansion with a semiconductor chip, etc. a carrier, or a printed wired board can be carried out by a slot etc. with this means, Even when using it under an environment with a repeat temperature gradient, bumps, such as a semiconductor chip, a carrier, or the footprint of a printed wired board maintains junction corresponding to sliding. The operation which can be used as the semiconductor device which has improved the cooling nature of a semiconductor chip with the semiconductor chip which can make connection dependability improve, a carrier, or the connection dependability and the thermally conductive matter with a footprint of a printed wired board is acquired.

[0012]

[Example] Hereafter, it explains with reference to the drawing of the example in connection with this invention of drawing 1 thru/or drawing 7.

[0013] It bundles up about the sign in connection with this invention of drawing 1 thru/or drawing 7 mainly used for the drawing of the connection structure example of a semiconductor chip and a carrier, and explains below. 1 is a semiconductor chip connected to a carrier 3 or a printed wired board 4 using the face down mounting technique. 2 is an absorption relaxation means which carries out absorption relaxation of the difference in the coefficient of thermal expansion of a carrier 3 or a printed wired board 4, and a semiconductor chip 1. 3 is a carrier which mounts a semiconductor chip 1. 4 is a printed wired board linked to a semiconductor chip 1 etc. 5 is a bump who becomes connection mediation with a carrier 3 or a printed wired board 4, and a semiconductor chip 1 using the face down mounting technique. 6 is a slot used as an absorption relaxation means 2 to absorb the differential thermal expansion prepared in a carrier 3 or a printed wired board 4. 7 is the infeed used as an absorption relaxation means 2 to absorb the differential thermal expansion prepared in a carrier 3 or a printed wired board 4. 8 is the sheet metal section formed of the slot 6 used as an absorption relaxation means 2 to absorb the differential thermal expansion prepared in a carrier 3 or a printed wired board 4. 9 is a hole used as an absorption relaxation means 2 to absorb the differential thermal expansion prepared in a carrier 3 or a printed wired board 4. 10 is the semiconductor device which mounted the semiconductor chip 1.

[0014] Drawing 1 is the principle Fig. of this invention, and (a) all shows (b) with the enlarged drawing of an important section with a sectional view in a bottom view. When the connection structure of the semi-conductor of this invention connected a semiconductor chip 1 etc. to a carrier 3 or a printed wired board 4 for example, using the CSP technique in this drawing, an absorption relaxation means 2 to absorb a differential thermal expansion with the semiconductor chip 1 by the slot etc. was formed in the carrier 3 or the printed wired board 4, and it considered as the gestalt which eases a bump's 5 thermal stress. making a slot absorb a part for thermal expansion by this -- even when using it under an environment with a repeat temperature gradient, a bump, a carrier, or printed wired boards, such as a semiconductor chip, can maintain junction corresponding to sliding, and can make connection dependability improve, since absorption relaxation of the differential thermal expansion with a semiconductor chip, etc. a carrier, or a printed wired board can be carried out and cooling of a semiconductor chip can be promoted with thermally conductive matter, such as a heat sink

[0015] Drawing 2 is the example Fig. of this invention, a bottom view shows (a) with the sectional view after fragmentation, and (b) all shows the sectional view before fragmentation, and (c) with the enlarged drawing of an important section. [when the connection structure of the semi-conductor of this invention is a gestalt with same terminal pitch of a semiconductor chip 1 which pulls out on a carrier 3 and does not have a conductor and external connection terminal pitch of a carrier 3 in this drawing] Said processing which can divide a carrier 3 for an absorption relaxation means 2 to absorb said differential thermal expansion, by a package or scan processing with a laser beam machine etc. easily after connection processing with a carrier 3 and a semiconductor chip 1, and same processing are beforehand performed to a carrier 3. The slot 6 which left the thickness of t which is not penetrated to a semiconductor chip 1 side was formed. Since a part for the slot which divides a carrier was cut and the carrier was subdivided after connection processing with a semiconductor chip by this, while narrowing the range on which it slides by thermal expansion and being able to lessen the amount of sliding, an open circuit can be prevented by making a slot absorb a part for thermal expansion. Moreover, cooling of a semiconductor chip can be promoted and the connection dependability of the bump of a semiconductor chip and a carrier can be made to improve more with that the cooling wind to a semiconductor chip touches on the surface of a semiconductor chip, or the thermally conductive matter.

[0016] Drawing 3 is other example Figs. of this invention, and (a) all shows (b) with the enlarged drawing of an important section with a sectional view in a bottom view. In this drawing, connection structure of the semi-conductor of this invention was made into the gestalt with the sheet metal section 8 which can set up the conductor which does not illustrate an absorption relaxation means 2 to absorb said differential thermal expansion, to a carrier 3 or a printed wired board 4 in

the slot 6 processed so that it might not penetrate to a semiconductor chip 1 side beforehand. Since it has the sheet metal section in a carrier or a printed wired board by this, It becomes the absorption relaxation means section which may pull out in the sheet metal section and may prepare a conductor and which absorbs a differential thermal expansion. An open circuit can be prevented, while a slot absorbs the range on which it slid by thermal expansion and can lessen the amount of sliding. It can apply, even when it is the gestalt which pulls out especially on a carrier and has a conductor and from which terminal pitches, such as a semiconductor chip, and the external connection terminal pitch of a carrier differ, and connection dependability can be maintained highly.

[0017] Drawing 4 is other example Figs. of this invention, and (a) all shows (b) with the enlarged drawing of an important section with a sectional view in a bottom view. In this drawing, the connection structure of the semi-conductor of this invention formed the hole 9 which becomes with the diameter of the minimum which penetrates the printed wired board 4 which set up an absorption relaxation means 2 to absorb said differential thermal expansion in the middle between bumps 5. It will be in the condition near the hole concerned subdividing a carrier or a printed wired board, since the hole was established in the carrier or the printed wired board by this, and while being able to become an absorption relaxation means by which a part for thermal expansion is absorbed in a hole, and absorbs a differential thermal expansion and being able to maintain more highly bumps, such as a semiconductor chip, a carrier, or connection dependability with a printed wired board, a cooling wind flows on the surface of a semiconductor chip by the hole, and it can make it possible to promote cooling with the thermally conductive matter again.

[0018] Drawing 5 is other example Figs. of this invention, and (a) all shows (b) with the enlarged drawing of an important section with a sectional view in a bottom view. In this drawing, the connection structure of the semi-conductor of this invention formed the long and slender infeed 7 in the periphery of a carrier 3 or a printed wired board 4 for an absorption relaxation means 2 to absorb said differential thermal expansion. Since infeed was prepared in the periphery of a carrier or a printed wired board by this, while being able to become an absorption relaxation means to absorb a differential thermal expansion and being able to maintain more highly bumps, such as a semiconductor chip, a carrier, or connection dependability with a printed wired board with infeed because it will be in the condition near subdividing a periphery with large carrier or amount of thermal expansion of a printed wired board, a cooling wind flows on the surface of a semiconductor chip with infeed, and cooling can be promoted with the thermally conductive matter again.

[0019] Drawing 6 is other example Figs. of this invention, and (a) all shows (b) with the enlarged drawing of an important section with a sectional view in a bottom view. In this drawing, the connection structure of the semi-conductor of this invention formed the slot 6 with the sheet metal section 8 which can set up the conductor which does not illustrate in a core an absorption relaxation means 2 to absorb said differential thermal expansion, to a carrier 3 or a printed wired board 4, and made it the gestalt with the still more long and slender infeed 7 on the periphery of a carrier 3 or a printed wired board 4. by this , the slot which have the sheet metal section in a carrier or a printed wired board be form in a core , it can write to the carrier or printed wired board which have long and slender infeed in the periphery of a carrier or a printed wired board further , even when it be the gestalt from which the terminal pitch of a semiconductor chip and the external connection terminal pitch of a carrier differ greatly with the absorption relaxation means of a duplex , it can apply , and a bump , a carrier , or connection dependability with a printed wired board can be maintain very highly . In addition; the structure concerned is most suitable for a gestalt with the conductor which connects between chips in a multichip format and which is not illustrated.

[0020] Drawing 7 is other example Figs. of this invention, and (a) all shows (b) with the enlarged drawing of an important section with a sectional view in a bottom view. In this drawing, the semiconductor device of the semi-conductor of this invention established an absorption relaxation means 2 to absorb a differential thermal expansion with the semiconductor chips 1, such as a slot, etc. to a carrier 3 or a printed wired board 4, and used it as the semiconductor device 10 using the connection structure which eases a bump's 5 thermal stress. Since absorption relaxation of the differential thermal expansion with a semiconductor chip, etc. a carrier, or a printed wired board can be carried out by this when a part for thermal expansion is absorbed by the slot etc., Even when using it under an environment with a repeat temperature gradient, a bump, a carrier, or printed wired boards, such as a semiconductor chip, maintain junction corresponding to sliding. It can be made the semiconductor device which has improved the semiconductor chip which can make connection dependability improve, a carrier, or connection dependability with a printed wired board and the cooling nature of a semiconductor chip.

[0021]
[Effect of the Invention] This invention explained above can expect the following effectiveness.

[0022] First, an absorption relaxation means to absorb a differential thermal expansion with a semiconductor chip etc. to a carrier or a printed wired board was established, and it considered as the gestalt which eases a bump's thermal stress. a part for thermal expansion is absorbed by the slot etc. by this -- even when using it under an environment with a repeat

temperature gradient, a bump, a carrier, or printed wired boards, such as a semiconductor chip, can maintain junction corresponding to sliding, and can make connection dependability improve, since absorption relaxation of the differential thermal expansion with a semiconductor chip, etc. a carrier, or a printed wired board can be carried out, and a cooling wind flows the front face of a semiconductor chip by a slot etc. and cooling of a semiconductor chip can be promoted with the thermally conductive matter again

[0023] Next, the slot which divides a carrier or a printed wired board for an absorption relaxation means to absorb said differential thermal expansion, after a carrier or a printed wired board, and connection processing with a semiconductor chip etc. was formed. Since a part for the slot which divides a carrier was cut and the carrier or the printed wired board was subdivided after connection processing with a semiconductor chip etc. by this, An open circuit can be prevented, while in addition to the aforementioned effectiveness a slot narrows the range on which it slides by thermal expansion and can lessen the amount of sliding. Moreover, the front face of a semiconductor chip is flowed, and a cooling wind can promote cooling of a semiconductor chip and can make bumps, such as a semiconductor chip, a carrier, or connection dependability with a printed wired board improve more with the thermally conductive matter further.

[0024] Moreover, the slot which has the sheet metal section for an absorption relaxation means to absorb said differential thermal expansion in a carrier or a printed wired board was formed. Since it has the sheet metal section in a carrier or a printed wired board by this, In addition to the aforementioned effectiveness, it becomes the absorption relaxation means section which may pull out in the sheet metal section and may prepare a conductor and which absorbs a differential thermal expansion. An open circuit can be prevented, while a slot absorbs the range on which it slid by thermal expansion and can lessen the amount of sliding. the case where it is the gestalt which pulls out especially on a carrier and has a conductor and from which terminal pitches, such as a semiconductor chip, and the external connection terminal pitch of a carrier differ -- applicable -- a conductor -- the region which can be set up is widely securable.

[0025] Furthermore, the hole which penetrates a carrier or a printed wired board for an absorption relaxation means to absorb said differential thermal expansion was formed. It will be in the condition near [in this] the hole concerned subdividing a carrier or a printed wired board in addition to the aforementioned effectiveness, since the hole was established in the carrier or the printed wired board, and while being able to become an absorption relaxation means absorb a differential thermal expansion by a part for thermal expansion being absorbed by the hole and being able to maintain more highly bumps, such as a semiconductor chip, a carrier, or connection dependability with a printed wired board, a cooling wind flows the front face of a semiconductor chip by the hole, and it can make it possible to promote cooling with the thermally conductive matter again.

[0026] Next, infeed was formed in the periphery of a carrier or a printed wired board for an absorption relaxation means to absorb said differential thermal expansion. By this, since infeed was prepared in the periphery of a carrier or a printed wired board, while being able to become an absorption relaxation means absorb a differential thermal expansion and being able to maintain more highly bumps, such as a semiconductor chip, a carrier, or connection dependability with a printed wired board with infeed because it will be in the condition near subdividing a periphery with large carrier or amount of thermal expansion of a printed wired board, a cooling wind flows the front face of a semiconductor chip with infeed, and cooling can be promoted with the thermally conductive matter in addition to the aforementioned effectiveness, again.

[0027] Moreover, the slot which has the sheet metal section for an absorption relaxation means to absorb said differential thermal expansion in a carrier or a printed wired board was formed, and infeed was further formed in the periphery of a carrier or a printed wired board. By this, form in a core the slot which has the sheet metal section in a carrier or a printed wired board, and it writes to the carrier or printed wired board which has infeed in the periphery of a carrier or a printed wired board further. It can apply, even when it is the gestalt from which a limit of the region which can be set up is lessened and the terminal pitch of a semiconductor chip and the external connection terminal pitch of a carrier differ greatly with the absorption relaxation means of a duplex. the aforementioned effectiveness -- adding -- a conductor -- A bump, a carrier, or connection dependability with a printed wired board can be maintained very highly. In addition, the structure concerned is most suitable for a gestalt with the conductor which connects between chips in a multichip format.

[0028] Furthermore, an absorption relaxation means to absorb a differential thermal expansion with a semiconductor chip etc. to a carrier or a printed wired board was established, and it considered as the semiconductor device using the connection structure which eases a bump's thermal stress. By this, since absorption relaxation of the differential thermal expansion with a semiconductor chip, etc. a carrier, or a printed wired board can be carried out by making a slot etc. absorb a part for thermal expansion, even when using it under an environment with a repeat temperature gradient, a bump, a carrier, or printed wired boards, such as a semiconductor chip, can maintain junction corresponding to sliding, and it can be made the semiconductor device which has improved connection dependability in addition to the aforementioned effectiveness.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the principle Fig. of this invention.

[Drawing 2] It is the example Fig. of this invention.

[Drawing 3] They are other example Figs. of this invention.

[Drawing 4] They are other example Figs. of this invention.

[Drawing 5] They are other example Figs. of this invention.

[Drawing 6] They are other example Figs. of this invention.

[Drawing 7] They are other example Figs. of this invention.

[Drawing 8] It is the example Fig. of the conventional example.

[Description of Notations]

1 Semiconductor Chip

2 Absorption Relaxation Means

3 Carrier

4 Printed Wired Board

6 Slot

7 Infeed

8 Sheet Metal Section

9 Hole

[Translation done.]

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CLAIMS

[Claim(s)]

[Claim 1] Connection structure of the semi-conductor characterized by what an absorption relaxation means (2) to absorb a differential thermal expansion with a semiconductor chip (1) etc. to a carrier (3) or a printed wired board (4) is established in the connection structure of the semi-conductor using the face down mounting technique of a semiconductor chip, and a bump's (5)'s thermal stress is eased for.

[Claim 2] Said absorption relaxation means (2) is the connection structure of the semi-conductor according to claim 1 characterized by what a carrier (3) or a printed wired board (4), and the slot (6) that divides a carrier (3) or a printed wired board (4) after connection processing with a semiconductor chip (1) etc. are formed for.

[Claim 3] Said absorption relaxation means (2) is the connection structure of the semi-conductor according to claim 1 characterized by what the slot (6) which has the sheet metal section (8) in a carrier (3) or a printed wired board (4) is formed for.

[Claim 4] Said absorption relaxation means (2) is the connection structure of the semi-conductor according to claim 1 characterized by what the hole (9) which penetrates a carrier (3) or a printed wired board (4) is formed for.

[Claim 5] Said absorption relaxation means (2) is the connection structure of the semi-conductor of claims 1 or 4 characterized by what infeed (7) is formed in the periphery of a carrier (3) or a printed wired board (4) for given in any 1 term.

[Claim 6] Said absorption relaxation means (2) is the connection structure of the semi-conductor of claims 2 or 5 characterized by what the slot (6) which has the sheet metal section (8) in a carrier (3) or a printed wired board (4) is formed, and infeed (7) is further formed in the periphery of a carrier (3) or a printed wired board (4) for given in any 1 term.

[Claim 7] The semiconductor device characterized by what an absorption relaxation means (2) to absorb a differential thermal expansion with a semiconductor chip (1) etc. to a carrier (3) or a printed wired board (4) is established in the semiconductor device using the face down mounting technique of a semiconductor chip, and a bump's (5)'s thermal stress is eased for.

[Translation done.]